Stellaris® LM3S2965 Evaluation Board

User's Manual

EK-LM3S2965-08

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Stellaris® LM3S2965 Evaluation Board

The Stellaris® LM3S2965 Evaluation Board is a compact and versatile evaluation platform for the Stellaris LM3S2965 ARM® Cortex™-M3-based microcontroller. The evaluation kit demonstrates a complete controller area network (CAN) using two Stellaris microcontrollers. The main evaluation board (EVB) configures a Stellaris LM3S2965 microcontroller as a CAN host. A small CAN device board, linked with a ribbon cable, uses a Stellaris LM3S2110 microcontroller. The function of each board is fully configurable in software.

You can use the board either as an evaluation platform or as a low-cost in-circuit debug interface (ICDI). In debug interface mode, the on-board microcontroller is bypassed, allowing for programming or debugging of an external target. The kit is also compatible with high-performance external JTAG debuggers.

This evaluation kit enables quick evaluation, prototype development, and creation of application-specific designs for CAN. The kit also includes extensive source-code examples, allowing you to start building C code applications quickly.

Figure 1-1. Stellaris LM3S2965 Evaluation Board Layout

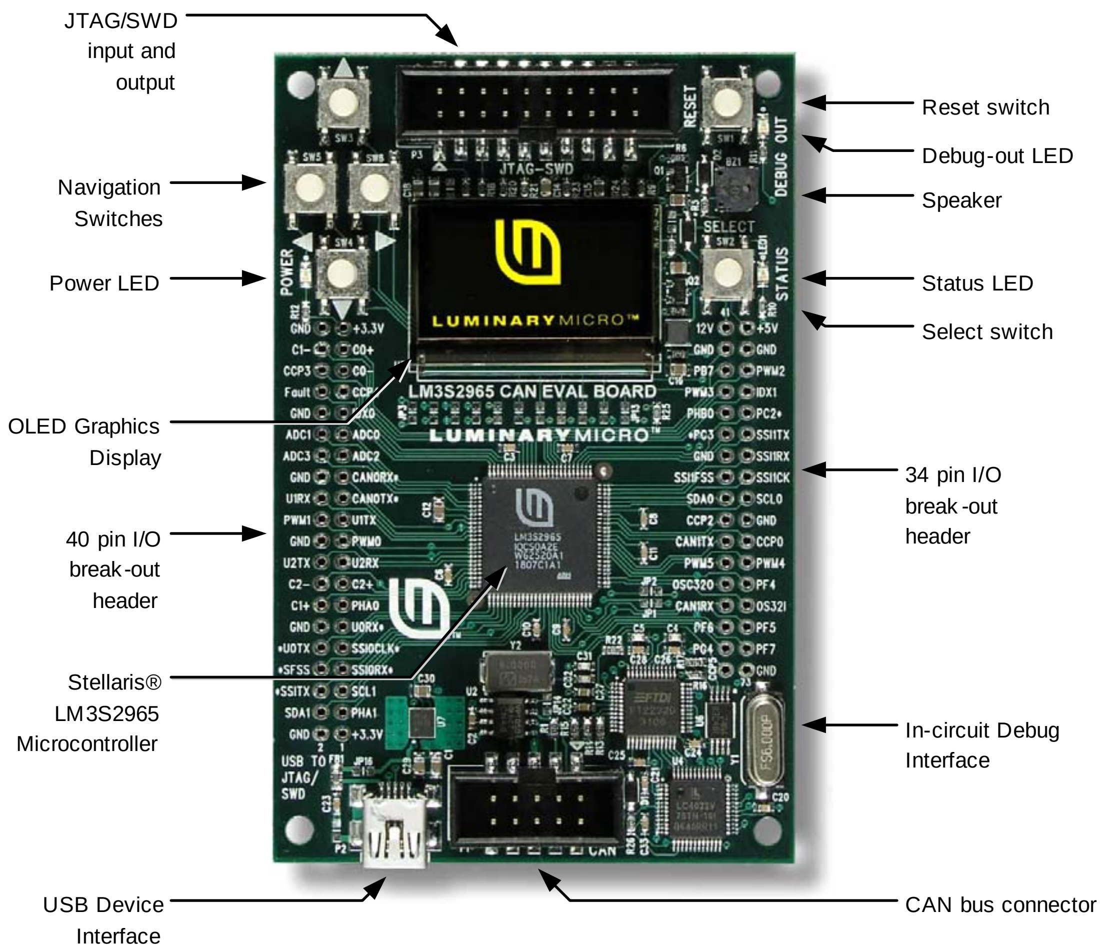
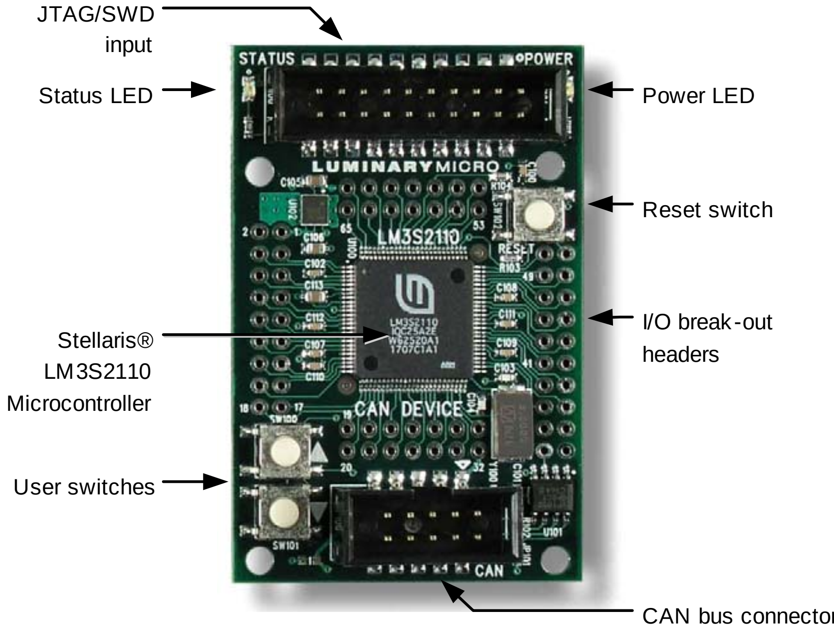


Figure 1-2. Stellaris LM3S2110 CAN Device Board



Features

The Stellaris LM3S2965 Evaluation Kit includes the following features:

- Stellaris LM3S2965 microcontroller with fully-integrated CAN module
- Standalone CAN device board using Stellaris LM3S2110 microcontroller
- Simple setup; USB cable provides serial communication, debugging, and power
- OLED graphics display with 128 x 96 pixel resolution
- User LED, navigation switches, and select pushbuttons
- Magnetic speaker
- LM3S2965 I/O available on labeled break-out pads
- Standard ARM® 20-pin JTAG debug connector with input and output modes
- USB interface for debugging and power supply

Block Diagram

Figure 1-3. LM3S2965 Evaluation Board Block Diagram

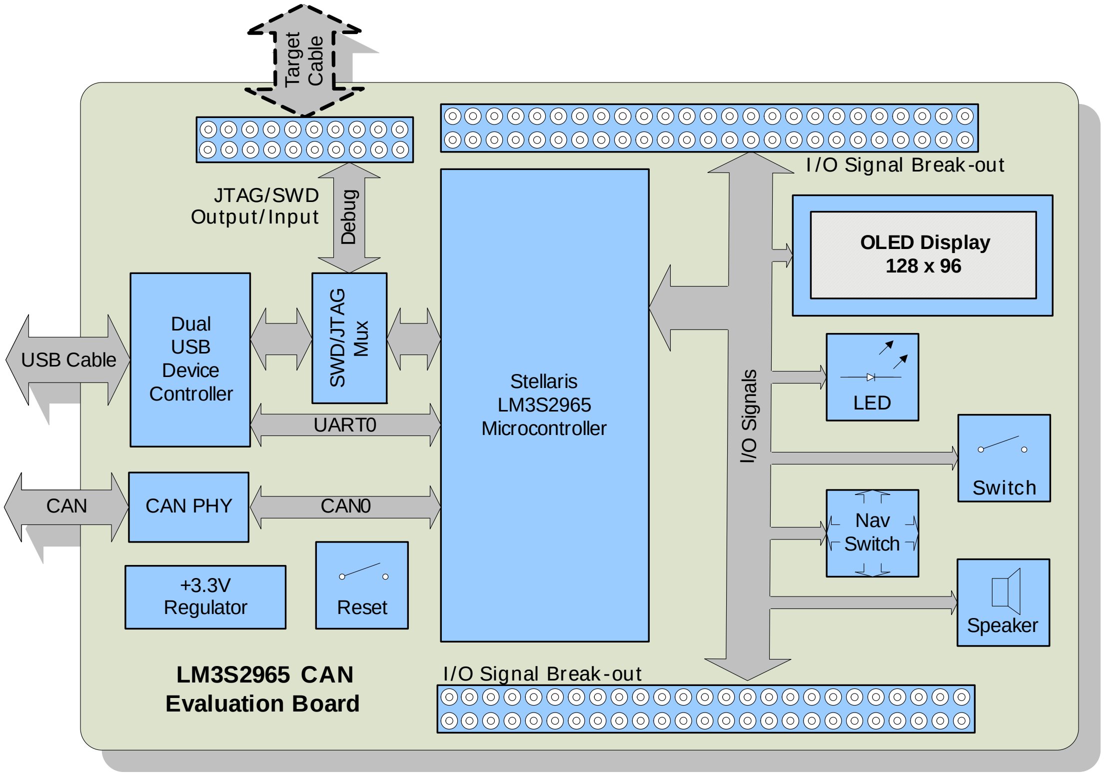
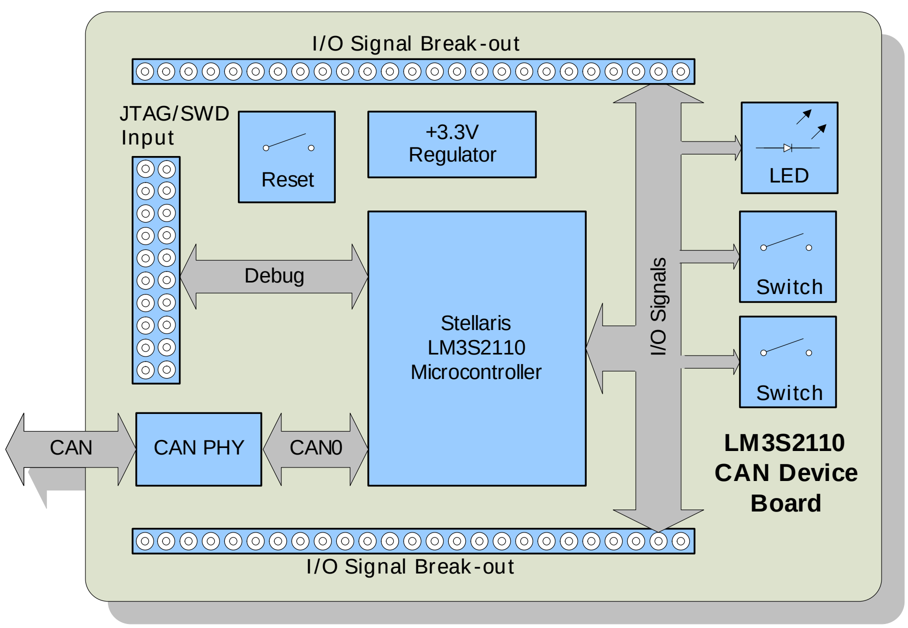


Figure 1-4. LM3S2110 CAN Device Board Block Diagram



Evaluation Kit Contents

The evaluation kit contains everything needed to develop and run applications for Stellaris microcontrollers including:

- LM3S2965 evaluation board (EVB)
- LM3S2110 CAN device board
- USB cable
- 20-pin JTAG/SWD target cable
- 10-pin CAN cable
- CD containing:
  - A supported version of one of the following (including a toolchain-specific Quickstart guide):
    - Keil™ RealView® Microcontroller Development Kit (MDK-ARM)
    - IAR Embedded Workbench
    - Code Sourcery GCC development tools
    - Code Red Technologies development tools
    - Texas Instruments' Code Composer Studio™ IDE
  - Complete documentation
  - Quickstart application source code
  - Stellaris® Firmware Development Package with example source code

Evaluation Board Specifications

- Board supply voltage: 4.37–5.25 Vdc from USB connector
- Board supply current: 120 mA typ (fully active, CPU at 50 MHz)
  200 mA (fully active, with sound)
- Break-out power output: 3.3 Vdc (60 mA max), 12 Vdc (15 mA max)
- Dimensions: 4.1” x 2.45” x 0.7” (LxWxH)

CAN Device Board Specifications

- Board supply voltage: 4.0-5.0 Vdc from CAN connector
- Board supply current: 40 mA typical
- Dimensions: 2.45” x 1.60” (LxW)

Features of the LM3S2965 Microcontroller

- 32-bit RISC performance using ARM® Cortex™-M3 v7M architecture
  - 50-MHz operation
  - Hardware-division and single-cycle-multiplication
  - Integrated Nested Vectored Interrupt Controller (NVIC)
  - 27 interrupt channels with eight priority levels

- 256-KB single-cycle flash
- 64-KB single-cycle SRAM
- Four general-purpose 32-bit timers
- Controller area network (CAN) module
- Three fully programmable 16C550-type UARTs
- Four 10-bit channels (inputs) when used as single-ended inputs
- Three independent integrated analog comparators
- Two I^2C modules
- Three PWM generator blocks
  - One 16-bit counter
  - Two comparators
  - One PWM generator
  - One dead-band generator
- Two QEI modules with position integrator for tracking encoder position
- Two synchronous serial interfaces (SSIs)
- 3 to 56 GPIOs, depending on user configuration
- On-chip low drop-out (LDO) voltage regulator

CHAPTER 2

Hardware Description

In addition to a microcontroller, the Stellaris LM3S2965 evaluation board includes a range of useful peripherals and an integrated ICDI. This chapter describes how these peripherals operate and interface to the microcontroller.

LM3S2965 Evaluation Board

LM3S2965 Microcontroller Overview

The heart of the EVB is a Stellaris LM3S2965 ARM Cortex-M3-based microcontroller. The LM3S2965 offers 256-KB flash memory, 50-MHz operation, a CAN module, and a wide range of peripherals. Refer to the LM3S2965 data sheet (order number DS-LM3S2965) for complete device details.

The LM3S2965 microcontroller is factory programmed with a quickstart demo program. The quickstart program resides in the LM3S2965 on-chip flash memory and runs each time power is applied, unless the quickstart has been replaced with a user program.

CAN Module

A key feature of the LM3S2965 is its CAN module that enables highly reliable communications at up to 1 Mbits/s. The LM3S2965 evaluation board includes a standard CAN transceiver and a 10-pin CAN connector whose signal assignments follow a commonly used CAN standard. A simple adaptor (not included in the kit) can be used to allow the use of standard DB-9 CAN cables.

An on-board 120-ohm resistor provides bus termination. This resistor can be removed if the board is not a network endpoint.

The CAN transceiver is configured in hardware to support speeds up to 1 Mbits/s. A resistor can be added to reduce the transceiver's drive slew-rate for slower data rates over longer distances.

Clocking

The LM3S2965 microcontroller has three on-chip oscillators, two are implemented on the EVB. A 8.0-MHz crystal completes the LM3S2965's main internal clock circuit. An internal PLL, configured in software, multiples this clock to 50-MHz for core and peripheral timing. At initial power on, the microcontroller operates directly from a 12-MHz internal oscillator.

Reset

The LM3S2965 microcontroller shares its external reset input with the OLED display. In the EVB, reset sources are gated through the CPLD, though in a typical application a simple wired-OR arrangement is sufficient.

Reset is asserted (active low) under any one of three conditions:

- Power-on reset
- Reset push switch SW1 held down
- Internal debug mode—By the USB device controller (U5 FT2232) when instructed by debugger

Power Supplies

The LM3S2965 is powered from a +3.3-V supply. A low drop-out (LDO) regulator regulates +5-V power from the USB cable to +3.3-V. +3.3-V power is available for powering external circuits.

A +15-V rail is available when the OLED display is active. The speaker and OLED display boost-converter operate directly from the +5-V rail.

Debugging

Stellaris microcontrollers support programming and debugging using either JTAG or SWD. JTAG uses the signals `TCK`, `TMS`, `TDI`, and `TDO`. SWD requires fewer signals (`SWCLK`, `SWDIO`, and, optionally, `SWO`, for trace). The debugger determines which debug protocol is used.

Debugging Modes

The LM3S2965 evaluation board supports a range of hardware debugging configurations. Table summarizes these.

Table 2-1. Stellaris LM3S2965 Evaluation Board Hardware Debugging Configurations

Mode	Debug Function	Use	Selected by
1	Internal ICDI	Debug on-board LM3S2965 microcontroller over USB interface.	Default mode
2	ICDI out to JTAG/SWD header	The EVB is used as a USB to SWD/JTAG interface to an external target.	Connecting to an external target and starting debug software. The red Debug Out LED will be ON.
3	In from JTAG/SWD header	For users who prefer an external debug interface (ULINK, JLINK, etc.) with the EVB.	Connecting an external debugger to the JTAG/SWD header

Modes 2 and 3 automatically detect the presence of an external debug cable. When the debugger software is connected to the EVB's USB controller, the EVB automatically selects Mode 2 and illuminates the red Debug Out LED. ICDI out (Mode 2) can be used to program and debug the small LM3S2110 CAN device board included in the kit.

Debug In Considerations

Debug Mode 3 supports evaluation board debugging using an external debug interface. Mode 3 is automatically selected when a device such as a Segger J-Link or Keil ULINK is connected.

Boards marked Revision C or later automatically configure pin 1 to be a 3.3-V reference, if an external debugger is connected. To determine the revision of your board, locate the product number on the bottom of the board; for example, EK-LM3S2965-C. The last character of the product number identifies the board revision.

A configuration or board-level change may be necessary when using an external debug interface with revisions A and B of this evaluation board. Because the evaluation board supports both debug out and debug in modes, pin 1 of the 20-pin JTAG/SWD header is, by default, not connected to +3.3 V. Consequently, devices requiring a voltage on pin 1 to power their line buffers may not work.

Two solutions exist. Some debugger interfaces (such as ULINK) have an internal power jumper that, in this case, should be set to internal +3.3-V power. Refer to debugger interface documentation for full details. However, if your debugger interface does not have a selectable power source, it may be necessary to install a 0-Ω resistor on the evaluation board to route power to pin 1. Refer to the schematics and board drawing in the appendix of this manual for the location of this resistor.

USB Functions

USB Overview

An FT2232 device from Future Technology Devices International Ltd manages USB-to-serial conversion. The FT2232 is factory configured to implement a JTAG/SWD port (synchronous serial) on channel A and a Virtual COM Port (VCP) on channel B. This feature allows two simultaneous communications links between the host computer and the target device using a single USB cable. Separate Windows drivers for each function are provided on the Documentation and Software CD.

A small serial EEPROM holds the FT2232 configuration data. The EEPROM is not accessible by the LM3S2965 microcontroller.

For full details on FT2232 operation, go to www.ftdichip.com.

USB to JTAG/SWD

The FT2232 USB device performs JTAG/SWD serial operations under the control of the debugger. A CPLD (U4) multiplexes SWD and JTAG functions and, when working in SWD mode, provides direction control for the bidirectional data line.

Virtual COM Port

The Virtual COM Port (VCP) allows Windows applications (such as HyperTerminal) to communicate with **`UART0`** on the LM3S2965 over USB. Once the FT2232 VCP driver is installed, Windows assigns a COM port number to the VCP channel.

Serial Wire Out

The evaluation board supports the Cortex-M3 serial-wire output (SWO) trace capabilities. Under debugger control, the CPLD can route the SWO datastream to the virtual communication port (VCP) transmit channel. The debugger can then decode and interpret the trace information received from the VCP. The normal VCP connection to `UART0` is interrupted when using SWO. Not all debuggers support SWO. Refer to the Stellaris LM3S3748 data sheet for additional information on the trace port interface unit (TPIU).

Organic LED Display

The EVB features an Organic LED (OLED) graphics display with 128 x 64 pixel resolution. OLED is a new technology that offers many advantages over LCD display technology.

Features

- RiT P14201 series display
- 128 columns by 96 rows
- High-contrast (typ. 500:1)
- Excellent brightness (120 cd/m^2)

- Fast response

Control Interface

The OLED display has a built-in controller IC with synchronous serial and parallel interfaces. Synchronous serial (SSI) is used on the EVB as it requires fewer microcontroller pins. Data cannot be read from the OLED controller; only one data line is necessary. Stellaris® Firmware Development Package (included on the Documentation and Software CD) contains complete drivers with source-code for the OLED display.

Power Supply

A +15-V supply is needed to bias the OLED display. A FAN5331 device from Fairchild combines with a few external components to complete a boost converter. A few external components complete the switching power supply. When the OLED display is operating, a small amount of power can be drawn from the +12-V rail to power other devices.

Design Guidelines

The OLED display has a lifetime of about 13,000 hours. It is also prone to degradation due to burn-in, similar to CRT and plasma displays. The quickstart application includes both a screen saver and a power-down mode to extend display life. These factors should be considered when developing EVB applications that use the OLED display.

Further Reference

For additional information on the RiT OLED display, visit www.ritekdisplay.com.

Other Peripherals

Speaker

A small, magnetic audio transducer connects through a MOSFET to `PD1/PWM1`, allowing a range of options for generating simple and complex tones. Use of the +5-V rail reduces switching noise on the +3.3-V rail.

Push Switches

The EVB has five general-purpose input switches. Four are arranged in a navigation-style configuration. The fifth functions as a Select switch.

User LED

A user LED (`LED1`) is provided for general use. The LED is connected to `PG2/PWM0`, allowing the option of either GPIO or PWM control (brightness control). Refer to the Quickstart Application source code for an example of PWM control.

Bypassing Peripherals

Excluding CAN and JTAG, the EVB's on-board peripheral circuits require 13 GPIO lines. This leaves 40 GPIO lines and 4 ADC channels immediately available for connection to external circuits. If an application requires more GPIO lines the on-board hardware can be disconnected. The EVB is populated with 3 jumper links, which can be cut with a knife to isolate on-board hardware. The process can be reversed by installing 0603- 0-ohm chip resistors.

Important*:* The quickstart application will not run if one or more jumpers are removed.

Table 2-2. Isolating On-Board Hardware

MCU Pin	MCU Assignment	To Isolate, Remove...
Pin 26 `PA0/U0RX`	Virtual COM port receive	JP1
Pin 27 `PA1/U0TX`	Virtual COM port transmit	JP2
Pin 16 `PG3/PWM1`	Sound	JP5
Pin 31 `PA5/SSI0TX`	OLED display data in	JP7
Pin 28 `PA2/SSI0CLK`	OLED display clock	JP6
Pin 22 `PC7/C2-`	OLED display data/control select	JP3
Pin 29 `PA3/SSI0FSS`	OLED display chip select	JP4
Pin 46 `PF5`	Down switch	JP8
Pin 43 `PF6`	Left switch	JP9
Pin 58 `PF4`	Up switch	JP10
Pin 42 `PF7`	Right switch	JP11
Pin 41 `PG4`	Select switch	JP12
Pin 47 `PG2/PWM0`	User LED	JP13
Pin 23 `PC6/C2+`	Enable +15 V	JP14

Interfacing to the EVB

An array of accessible I/O signals makes it easy to interface the EVB to external circuits. All LM3S2965 I/O lines (except those with both JTAG and SWD functions) are brought out to 0.1" pitch pads. For quick reference, silk-screened labels on the PCB show primary pin functions.

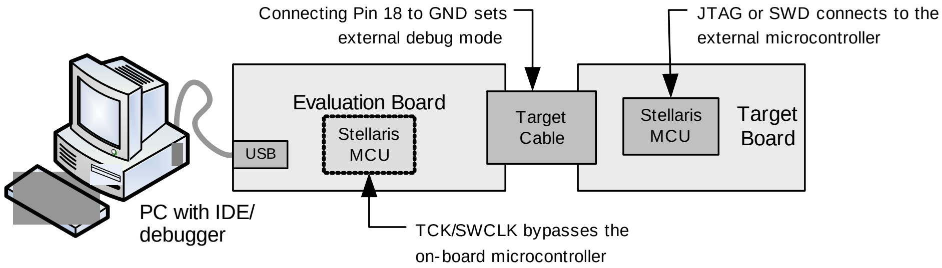
Table B-1 on page 29 has a complete list of I/O signals as well as recommended connectors.

Most LM3S2965 I/O signals are +5-V tolerant. Refer to the LM3S2965 data sheet for detailed electrical specifications.

Using the In-Circuit Debugger Interface

The Stellaris LM3S2965 Evaluation Kit can operate as an In-Circuit Debugger Interface (ICDI). ICDI acts as a USB to the JTAG/SWD adaptor, allowing debugging of any external target board that uses a Stellaris microcontroller. See "Debugging Modes" on page 14 for a description of how to enter Debug Out mode.

Figure 2-1. ICD Interface Mode



The debug interface operates in either serial-wire debug (SWD) or full JTAG mode, depending on the configuration in the debugger IDE.

The IDE/debugger does not distinguish between the on-EVB Stellaris microcontroller and an external Stellaris microcontroller. The only requirement is that the correct Stellaris device is selected in the project configuration.

C H A P T E R 3

CAN Device Board Hardware Description

The CAN device board uses a Stellaris LM3S2110 microcontroller to demonstrate a complete two-node network. The board can be used with the main LM3S2965 evaluation board or as a standalone board.

Device Overview

The Stellaris LM3S2110 ARM Cortex-M3-based microcontroller has 64-KB flash memory, 25-MHz operation, a CAN module, and a wide range of peripherals. For complete device details, see the LM3S2110 data sheet (order number DS-LM3S2110).

The LM3S2110 microcontroller is factory programmed with a quickstart demonstration program that adds a remote volume control feature to the quickstart application. The quickstart program resides in the LM3S2110 on-chip flash memory and runs each time power is applied, unless the quickstart has been replaced with a user program.

Power Supply

The CAN device board receives +5.0-V power from the CAN bus and should not be connected to a CAN bus that ha a power wire voltage of greater than 10.0 V. If the bus is unpowered, a +5.0-V local power supply must be provided. The LM3S2110 is powered from a +3.3-V rail, supplied by a low drop-out (LDO) regulator. +3.3-V power is available for powering external circuits.

Programming and Debugging

A standard two-way header supports both JTAG And SWD programming and debugging using either the main LM3S2965 board in ICDI out mode or a full-featured debug interface.

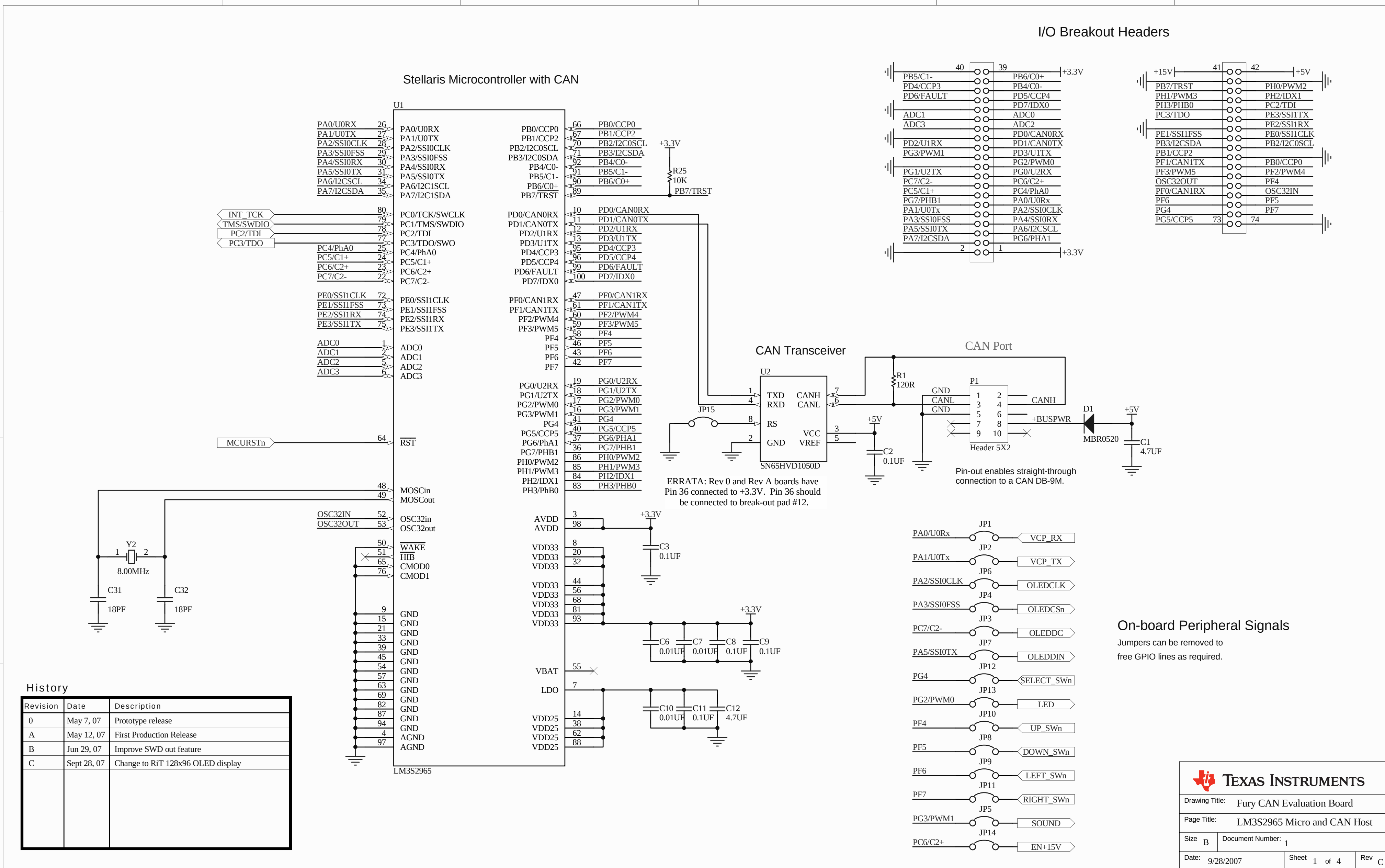
Interfacing

Two push switches and an LED implement a very simple user interface. The board’s capabilities are easily expanded using the I/O breakout headers. For breakout header signal assignments see Figure B-4., “LM3S2110 CAN Device Board Connections,” on page 30.

APPENDIX A

Schematics

This section contains the schematics for the LM3S1968 Evaluation Board:



History

Revision	Date	Description
0	May 7, 07	Prototype release
A	May 12, 07	First Production Release
B	Jun 29, 07	Improve SWD out feature
C	Sept 28, 07	Change to RiT 128x96 OLED display

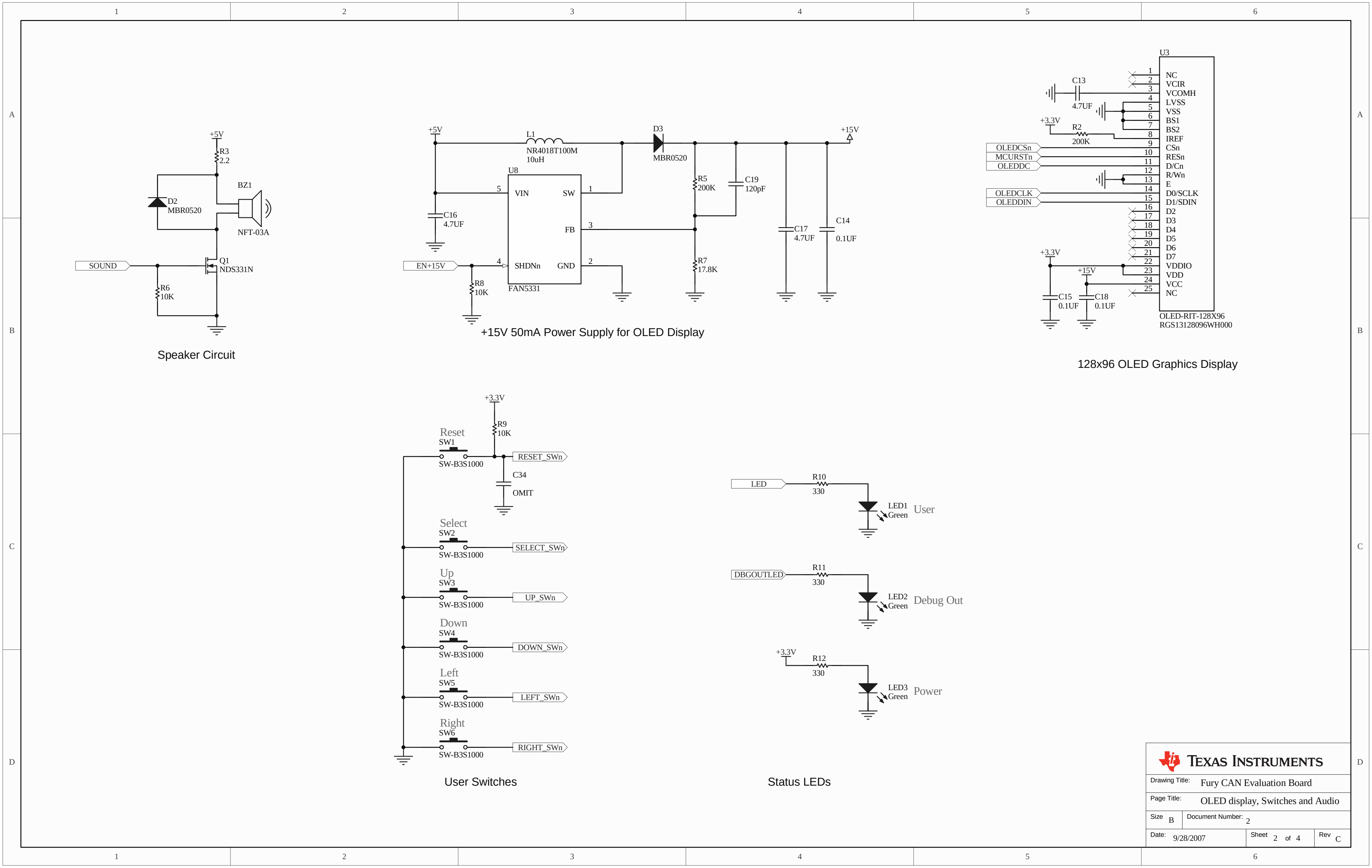
TEXAS INSTRUMENTS

Drawing Title: Fury CAN Evaluation Board

Page Title: LM3S2965 Micro and CAN Host

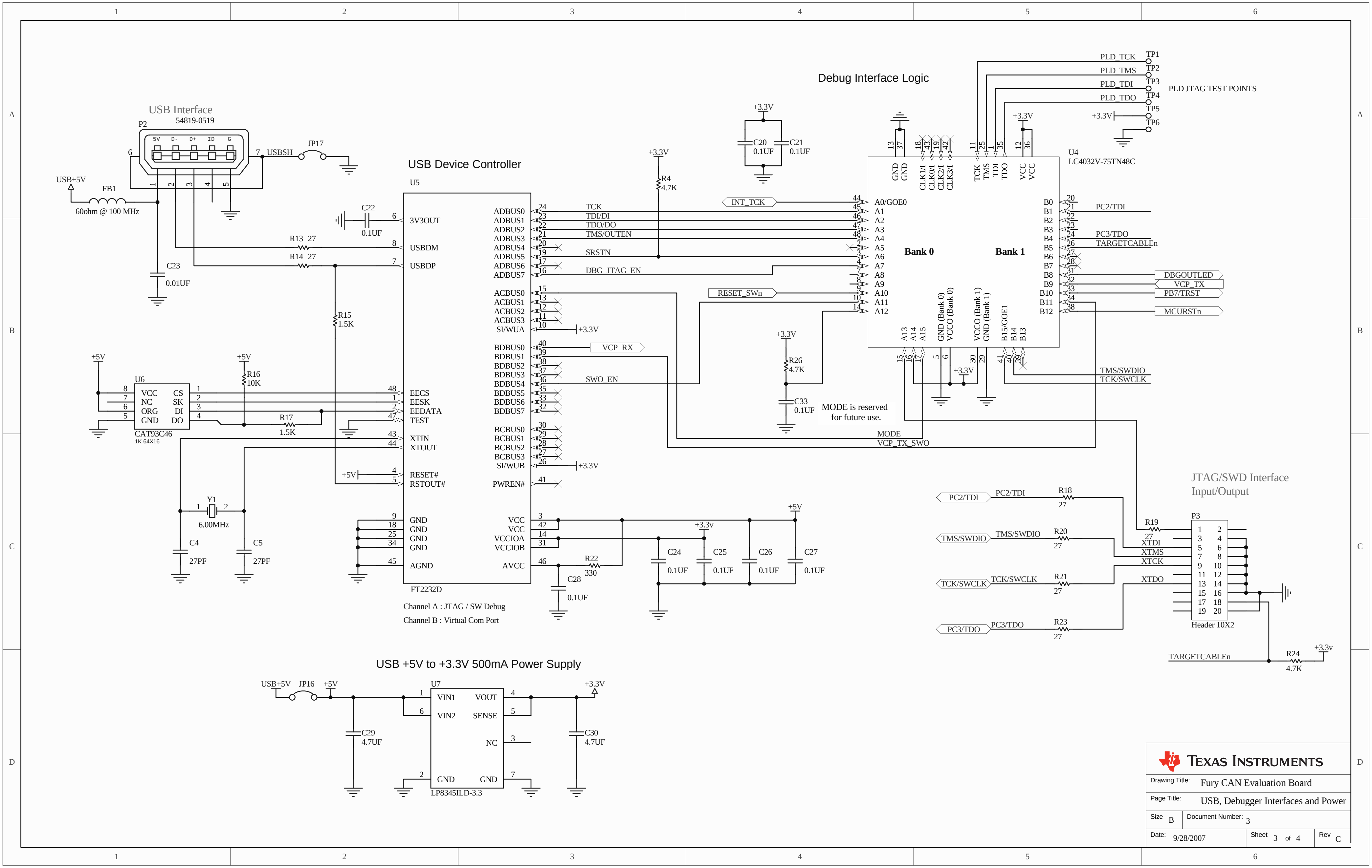
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Date: 9/28/2007 | Sheet 1 of 4 | Rev C

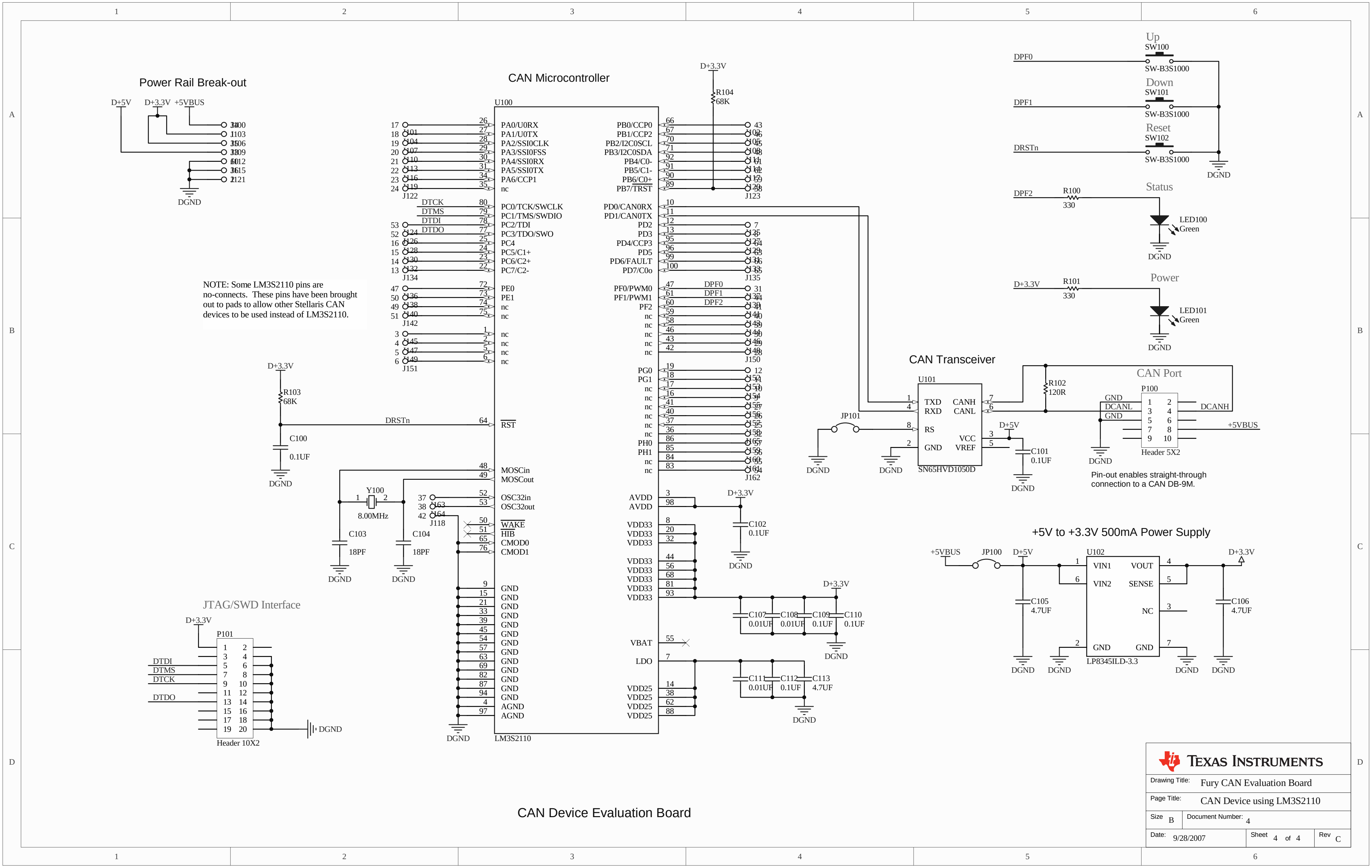


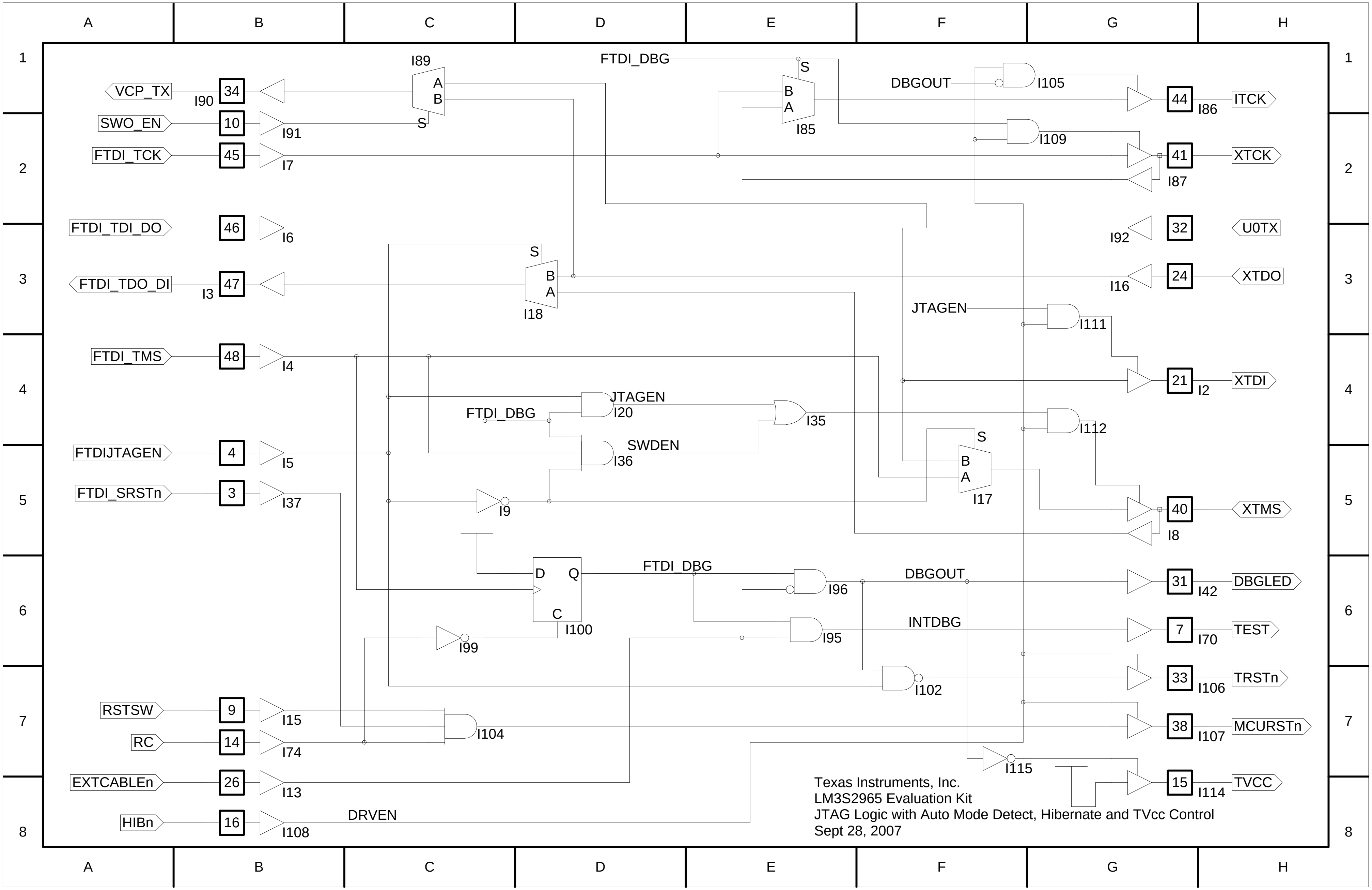
TEXAS INSTRUMENTS

Drawing Title:	Fury CAN Evaluation Board
Page Title:	OLED display, Switches and Audio
Size: B	Document Number: 2
Date: 9/28/2007	Sheet 2 of 4 — Rev C



Debug Interface Logic
USB Interface
54819-0519
USB Device Controller
FT2232D
Channel A : JTAG / SW Debug
Channel B : Virtual Com Port
PLD JTAG TEST POINTS
LC4032V-75TN48C
Bank 0
Bank 1
MODE is reserved for future use.
JTAG/SWD Interface Input/Output
Header 10X2
CAT93C46
1K 64X16
USB +5V to +3.3V 500mA Power Supply
LP8345ILD-3.3
Texas Instruments
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Power Rail Break-out
D+5V
D+3.3V
+5VBUS
DGND
CAN Microcontroller
U100
LM3S2110
PA0/U0RX
PA1/U0TX
PA2/SSI0CLK
PA3/SSI0FSS
PA4/SSI0RX
PA5/SSI0TX
PA6/CCP1
PC0/TCK/SWCLK
PC1/TMS/SWDIO
PC2/TDI
PC3/TDO/SWO
PC4
PC5/C1+
PC6/C2+
PC7/C2-
PE0
PE1
RST
MOSCin
MOSCout
OSC32in
OSC32out
WAKE
HIB
CMOD0
CMOD1
GND
AGND
PB0/CCP0
PB1/CCP2
PB2/I2C0SCL
PB3/I2C0SDA
PB4/C0-
PB5/C1-
PB6/C0+
PB7/TRST
PD0/CAN0RX
PD1/CAN0TX
PD2
PD3
PD4/CCP3
PD5
PD6/FAULT
PD7/C0o
PF0/PWM0
PF1/PWM1
PF2
PG0
PG1
PH0
PH1
AVDD
VDD33
VBAT
LDO
VDD25
NOTE: Some LM3S2110 pins are no-connects. These pins have been brought out to pads to allow other Stellaris CAN devices to be used instead of LM3S2110.
R104 68K
R103 68K
DRSTn
C100 0.1UF
Y100 8.00MHz
C103 18PF
C104 18PF
C102 0.1UF
C107 0.01UF
C108 0.01UF
C109 0.1UF
C110 0.1UF
C111 0.01UF
C112 0.1UF
C113 4.7UF
JTAG/SWD Interface
P101
Header 10X2
DTDI
DTMS
DTCK
DTDO
Up
SW100
SW-B3S1000
Down
SW101
Reset
SW102
DPF0
DPF1
DPF2
Status
R100 330
LED100 Green
Power
R101 330
LED101 Green
CAN Transceiver
U101
SN65HVD1050D
TXD
RXD
RS
GND
CANH
CANL
VCC
VREF
JP101
R102 120R
C101 0.1UF
CAN Port
P100
Header 5X2
DCANL
DCANH
Pin-out enables straight-through connection to a CAN DB-9M.
+5V to +3.3V 500mA Power Supply
JP100
U102
LP8345ILD-3.3
VIN1
VIN2
VOUT
SENSE
NC
C105 4.7UF
C106 4.7UF
CAN Device Evaluation Board
Texas Instruments
Drawing Title: Fury CAN Evaluation Board
Page Title: CAN Device using LM3S2110
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Rev C



Texas Instruments, Inc.
LM3S2965 Evaluation Kit
JTAG Logic with Auto Mode Detect, Hibernate and TVcc Control
Sept 28, 2007

APPENDIX B

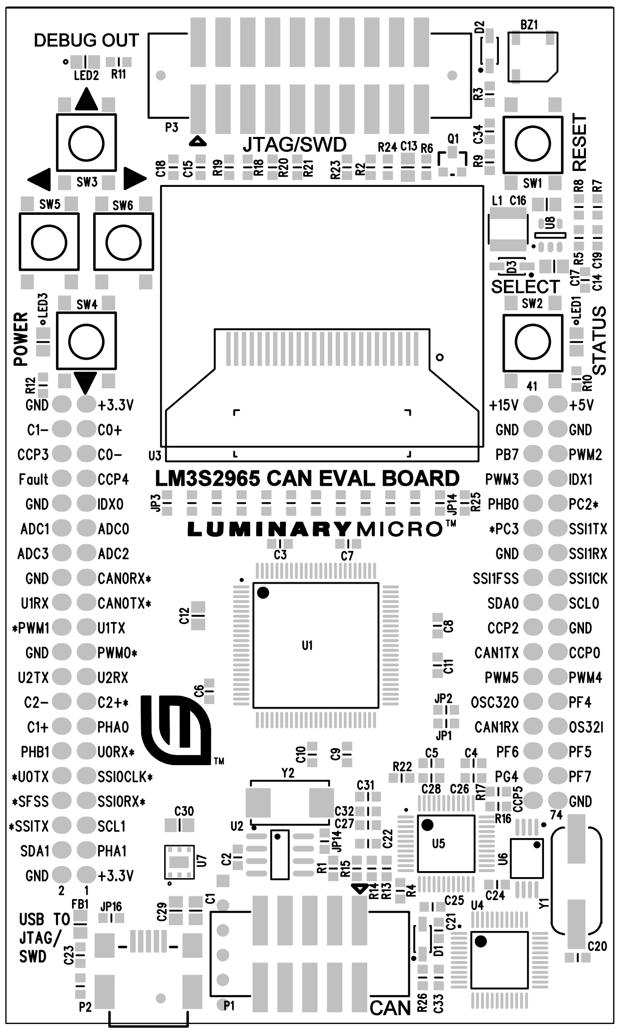
Connection Details

This appendix contains the following sections:

- Component Locations
- Evaluation Board Dimensions
- I/O Breakout Pads
- ARM Target Pinout
- References

Component Locations

Figure B-1. Component Locations



Evaluation Board Dimensions

Figure B-2. LM3S2965 Evaluation Board Dimensions

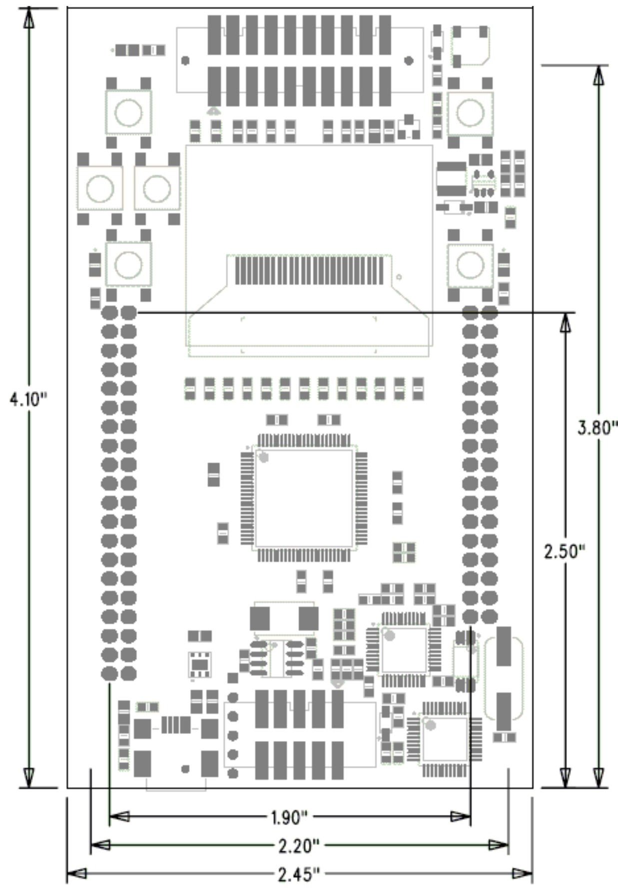
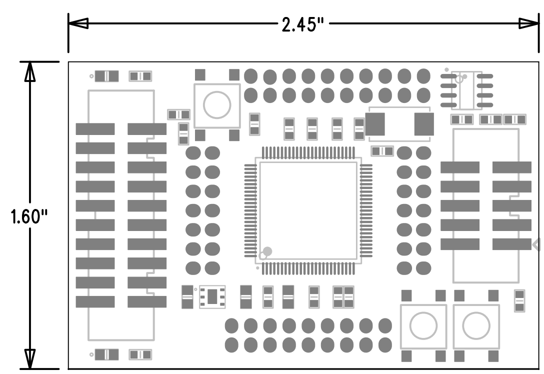


Figure B-3. LM3S2110 CAN Device Board Dimensions



I/O Breakout Pads

The LM3S2965 EVB has 57 I/O pads, 15 power pads, and 2 crystal connections, for a total of 74 pads. Connection can be made by soldering wires directly to these pads, or by using 0.1” pitch headers and sockets.

Note: In Table B-2, an asterisk (*) by a signal name (also on the EVB PCB) indicates the signal is normally used for on-board functions. Normally, you should cut the associated jumper (JP1-15) before using an assigned signal for external interfacing.

Table B-1. I/O Breakout Pads

Description	Pad No.	Pad No.	Description	Description	Pad No.	Pad No.	Description
GND	40	39	+3.3 V	+12 V	41	42	+5 V
PB5/C1-	38	37	PB6/C0+	GND	43	44	GND
PD4/CCP3	36	35	PB4/C0-	PB7/$\overline{\text{TRST}}$	45	56	PH0/PWM2
PD6/FAULT	34	33	PD5/CCP4	PH1/PWM3	47	48	PH2/IDX1
ADC1	30	29	ADC0	PC3/TDO	51	52	PE3/SSI1TX
ADC3	28	27	ADC2	GND	53	54	PE2/SSI1RX
GND	26	25	PD0/CAN0RX	PE1/SSI1FSS	55	56	PE0/SSI1CLK
PD2/U1RX	24	23	PD1/CAN0TX	PB3/I2CSDA	57	58	PB2/I2C0SCL
PG3/PWM1*	22	21	PD3/U1TX	PB1/CCP2	59	60	GND
GND	20	19	PG2/PWM0*	PF1/CAN1TX	61	62	PB0/CCP0
PG1/U2TX	18	17	PG0/U2RX	PF3/PWM5	63	64	PF2/PWM4
PC7/C2-*	16	15	PC6/C2+*	OSC32OUT	65	66	PF4*
PC5/C1+	14	13	PC4/PHA0	PF0/CAN1RX	67	68	OSC32IN
GND	12	11	PA0/U0RX*	PF6*	69	70	PF5*
PA1/U0TX*	10	9	PA2/SSI0CLK*	PG4*	71	72	PF7*
PA3/SSI0FSS*	8	7	PA4/SSI0RX	PG5/CCP5	73	74	GND
PA5/SSI0TX*	6	5	PA6/I2CSCL				
PA7/I2C1SDA	4	3	PG6/PHA1				
GND	2	1	+3.3 V				

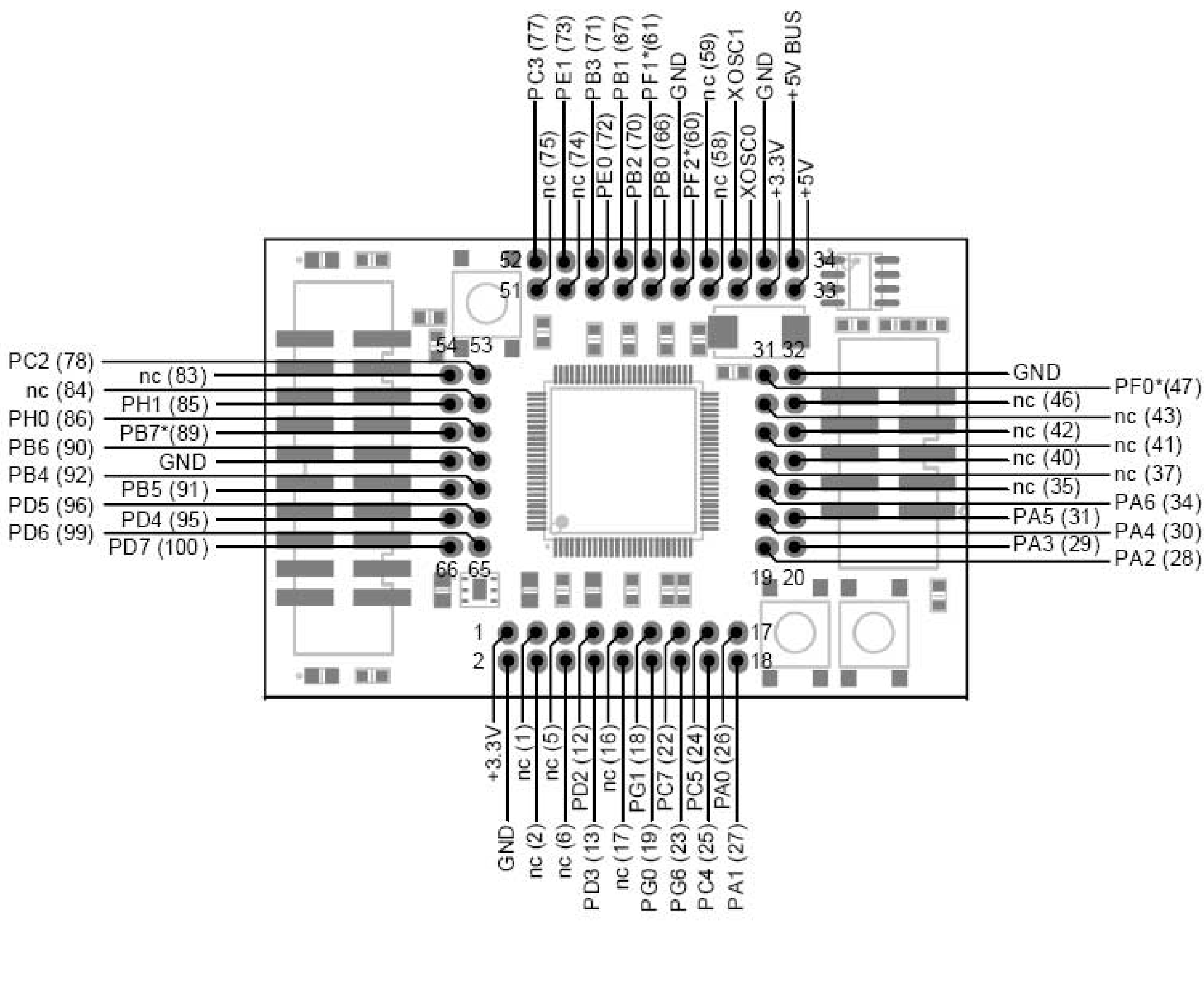
Recommended Connectors

Connection can be made by soldering wires directly to pads or using 0.1” pitch headers and sockets.

Table B-2. Recommended Connectors

Pins 1-40 (2 x 20 way)	PCB Socket	Sullins PPPC202LFBN-RC	Digikey S7123-ND
	Cable Socket	3M 89140-0101	Digikey MKC40A-ND
	Pin Header	Sullins PEC20DAAN	Digikey S2012E-20-ND
Pins 41-74 (2 x 17 way)	PCB Socket	Sullins PPPC172LFBN-RC	Digikey S7120-ND
	Cable Socket	3M 89134-0101	Digikey MKC34A-ND
	Pin Header	Sullins PEC17DAAN	Digikey S2012-17-ND

Figure B-4. LM3S2110 CAN Device Board Connections



ARM Target Pinout

In ICDI input and output mode, the Stellaris LM3S2965 Evaluation Kit supports ARM's standard 20-pin JTAG/SWD configuration. The same pin configuration can be used for debugging over serial-wire debug (SWD) and JTAG interfaces. The debugger software, running on the PC, determines which interface protocol is used.

The Stellaris target board should have a 2x10 0.1" pin header with signals as indicated in Table B-3. This applies to both external Stellaris MCU targets (Debug output mode) and to external JTAG/SWD debuggers (Debug input mode).

Table B-3. 20-Pin JTAG/SWD Configuration

Function	Pin	Pin	Function
VCC (optional)	1	2	nc
nc	3	4	GND
TDI	5	6	GND
TMS	7	8	GND
TCK	9	10	GND
nc	11	12	GND
TDO	13	14	GND
nc	15	16	GND
nc	17	18	GND
nc	19	20	GND

ICDI does not control $\overline{\text{RST}}$ (device reset) or $\overline{\text{TRST}}$ (test reset) signals. Both reset functions are implemented as commands over JTAG/SWD, so these signals are not necessary.

It is recommended that connections be made to all GND pins; however, both targets and external debug interfaces must connect pin 18 and at least one other GND pin to GND.

References

In addition to this document, the following references are included on the Stellaris Family Development Kit documentation CD-ROM and are also available for download at www.ti.com/stellaris:

- *Stellaris LM3S2965 Evaluation Kit Quickstart Guide* for appropriate tool kit (see "Evaluation Kit Contents," on page 10)
- *Stellaris LM3S2965 Read Me First* for the CAN Evaluation Kit
- StellarisWare® Driver Library, Order number SW-DRL
- *StellarisWare® Driver Library User's Manual*, publication number SW-DRL-UG
- *Stellaris LM3S2965 Data Sheet*, publication DS-LM3S2965

Additional references include:

- *Future Technology Devices Incorporated FT2232C Datasheet*
- Information on development tool being used:
  - RealView MDK web site, www.keil.com/arm/rvmdkkit.asp
  - IAR Embedded Workbench web site, www.iar.com
  - Code Sourcery GCC development tools web site, www.codesourcery.com/gnu_toolchains/arm
  - Code Red Technologies development tools web site, www.code-red-tech.com
  - Texas Instruments' Code Composer Studio™ IDE web site, www.ti.com/ccs